

REMARKS

Introduction

Claims 1-20 were originally pending in this application. Claims 1, 7, 12, 13, 18 and 19 have been previously amended in this case. Claims 1-20 remain in this application.

Claim Rejections

35 U.S.C. §103(a)

Claims 1, 2, 4-8, 11-13, 15 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Hart et al. '457 patent. Similarly, claims 10 and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Heart et al. '457 patent as applied to claims 1, 2, 4-8, 11-13, 15 and 16 further in view of the Fangman '929 patent. Claim 17 was also rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Hart et al. '457 patent as applied to claims 1, 2, 4-8, 11-13, 15 and 16 further view of the DeBiasse '544 patent. Additionally, claims 3, 9 and 18-20 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Heart et al. '457 patent as applied to claims 1, 2, 4-8, 11-13, 15 and 16 further view of the Lindstrom '285 patent. Applicants respectfully traverse these rejections and submit that the claims distinguish the present invention over the prior art of record.

The Prior Art

JP2-100821

The Japanese JP-100821 patent has no English translation. At page 2 of the June 6, 2005 Office Action, the Examiner asserts this Japanese Patent shows certain features: "Note a piston 2, connecting rod 3, and a piston pin 1a having a smoothly profiled outer circumference that is

substantially circular in cross section with a larger diameter at the distal ends than at the center portion, which tapers gradually from the distal ends to the center portion.” The Examiner further asserts, “JP2-100821 does utilize a bushing for the piston pin, as is conventional in the art, but does not rely upon the piston pin for patentability.” *Id.* at 6. Applicants respectfully note that the patentability in Japan of the device disclosed in the JP2-100821 patent is not at issue here. Moreover, applicants cannot agree with the Examiner’s interpretation of the JP2 ‘821 reference.

Referring specifically to the figures, the JP2-100821 patent discloses a connecting rod and multi-part piston pin. In one embodiment, the JP2-100821 patent teaches a connecting rod having a *bushing* and a *multi-part piston pin* assembly. The multi-part piston pin assembly includes a substantially cylindrical center portion 4 having a *uniform outer diameter* that is surrounded by a cylindrical bushing. Obviously, given this structure, the center portion 4 is not tapered. The assembly further includes a pair of frustro-conically shaped end portions that appear to rotationally fix the piston pin relative to the piston. At least one of the frustro-conically shaped end portions is distinct from the cylindrical center portion. Each end portion is held in place via end caps. (Figs. 1 and 4). The other embodiment includes a *multi-part piston pin* including a center portion *having a cylindrically uniform outer diameter* and end caps adjacent the distal ends of the center portion (Fig. 6). To the extent that the Examiner disputes this understanding of what JP2-100821 teaches, applicants respectfully request an English translation of this reference. *Ex parte Jones*, 62 USPQ2d 1206; See also MPEP 700-21.

In any event, applicants respectfully submit that JP2-100821 neither discloses nor suggests a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does JP2-100821 disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and

that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Rather, the Japanese pin has a uniform cylindrical outer diameter that extends between a pair of separate end portions. Moreover, JP2-100821 neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

The Hart et al. '457 Patent

The Hart et al. '457 patent discloses a bushingless piston and connecting rod assembly coupled by a wrist pin. Both the assembly and the wrist pin include a running surface, where at least one of these running surfaces includes a manganese phosphate coating. The Hart et al. '457 patent employs a manganese phosphate coating 36 in lieu of a bushing within heavy-duty diesel engines where the tribological properties of the diesel engine tend to corrode traditional bushings and to more directly place the load during operation onto the parent materials of the connecting rod and wrist pin. The manganese phosphate coating 36 includes a thickness of about 8.0 to 15.0 μm , an application weight of about $2.15 \pm 1.08 \text{ mg/cm}^2$, and a grain size of about $30 \pm 15 \mu\text{m}$. The manganese phosphate coating 36 is applied to the running surface 34 of the wrist pin 32 to act on the steel running surfaces 22 and 30 of the piston body 12 and connecting rod 24, respectively (Figs. 1-2). Alternatively, the manganese phosphate coating 136 is applied to the running surface 122 of the piston body 112 or the running surface 130 of the connecting rod 124 to act on the steel running surface 134 of the wrist pin (Fig. 3).

However, the Hart et al. '457 patent does not make up for the deficiencies of JP2-100821. Specifically, the Hart et al. '457 patent does not disclose or suggest the use of a ***smoothly profiled piston pin*** having an outer circumference that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion and that ***gradually***

tapers from the distal ends to the center portion as required by claims 1, 7, 12, and 18. Nor does Hart et al. disclose or suggest such a pin used in connection with a connecting rod including a phosphatized coating having a thickness between two and less than eight microns as required by independent claims 1 and 7. Rather, the Hart et al. '457 patent teaches away from the present invention by arguing the importance of a manganese phosphate coating having a thickness between 8.0 to 15.0 μm (Column 3, lines 9-12). Furthermore, the Hart et al. '457 patent neither discloses nor suggests a connecting rod having an internal gallery to direct lubricant between the first and second ends of the connecting rod as required by independent claims 12 and 18.

The Fangman '929 Patent

The Fangman '929 Patent discloses a piston pin having an arcuate upper and lower surface joined by concave surfaces along the length and across the ends thereof. Specifically, the Fangman '929 patent teaches a piston 17 having an I-beam shape and a piston rod shaped in such a way as to suitably receive the piston pin 17. However, the Fangman '929 patent does not make up for the deficiencies of JP2-100821 and the Heart et al. '457 patent.

The Fangman '929 patent does not disclose or suggest a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does the Fangman '929 patent disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Moreover, the Fangman '929 patent neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly

therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

The DeBiasse '544 Patent

The DeBiasse '544 patent discloses a lubricating means for relatively rotatable engine part connected by a pin. Specifically, the DeBiasse '544 patent discloses a piston 12 and piston rod 16 connected by a pin 60. The piston 12 includes bores 54 and 56 and the piston rod 16 includes a bore 58 to receive the pin 60. Each of the bores 54 and 56 include recesses 68 and 70 to form pockets of oil along the surfaces between the wrist pin 60 and the bores 54 and 56. The piston 12 may also include tangential ducts 72 and 74 to supply oil to the surfaces between the wrist pin 60 and the bores 54 and 56.

However the DeBiasse '544 patent does not disclose or suggest a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does the DeBiasse '544 patent disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Moreover, the DeBiasse '544 patent neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

The Lindstrom '285 Patent

The Lindstrom '285 patent discloses a lubrication system for a connecting rod 42, piston 44, and wrist pin 46 used in a hermetic refrigeration compressor motor 8. The Lindstrom

connecting rod 42 has three oil ports 64, 66, 68 to direct oil toward the inner surfaces 72, 77 of the piston 44 and piston crown 60, respectively, as well as toward the wrist pin 46 during operational movement of the connecting rod 42 within the cylinder 14 of a hermetic refrigeration compressor motor 8.

However, the Lindstrom '285 patent does not disclose or suggest a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does the Lindstrom '285 patent disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Moreover, the Lindstrom '285 patent neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

The Uehara et al. '518 and Kagohara et al. '918 Patents.

The Uehara et al. '518 patent is cited as disclosing a thickness of phosphate coating of 2 to 8 micrometers. The Kagohara et al. '918 patent is cited as disclosing a thickness of phosphate coating of 2 to 30 micrometers. The Examiner cites these patents as evidence that a particular coating depth does not provide a patentable distinction over the prior art. However, these patents do not make up for the deficiencies of the JP2-100821, Heart et al. '457, Fangman '929, DeBiasse '544 and Lindstrom '285 patents. Specifically, the Uehara et al. '518 patent teaches applying a phosphate coating as part of an anti-rust treatment to rotating brake members of a braking device. The Kagohara et al. '918 patent teaches the application of a phosphate coating

as part of a multi-layer sliding bearing, which also includes a thermally conductive coating, a back metal layer and a sliding layer.

The Present Invention

In contrast to the references of record in this case, the present invention, as defined in independent claim 1, is directed toward a piston and connecting rod assembly for use with an internal combustion engine. The assembly includes a piston having a body including a pin bore and a connecting rod to interconnect the piston and a crankshaft. The connecting rod has first and second ends with at least one of the ends including a bore extending therethrough and adapted to be aligned with the pin bore within a piston. The assembly further includes a pin that is received through the aligned pin bore of the piston and the bore extending through the end of the connecting rod. Each of independent claims 1, 7, 12, and 18 clarify that the pin includes a pair of distal ends, a center portion formed therebetween and a *smoothly profiled outer circumference* that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion. In addition, each of independent claims 1, 7, 12, and 18 clarify that the outer circumference of the pin *gradually tapers from the distal ends to the center portion*. The end of the connecting rod that is aligned with the piston pin bore includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the profiled piston pin. The phosphatized coating has a thickness between two and less than eight microns. In addition, the present invention, as defined in independent claim 7, is directed toward a piston and connecting rod assembly as described above where the smoothly profiled outer circumference of the pin includes a phosphatized coating having a thickness between two and less than eight microns and

the end of the connecting rod that is aligned with the piston pin bore does not include a phosphatized coating.

The present invention as defined in independent claim 12 is also directed toward a piston and connecting rod assembly for use with an internal combustion engine. The connecting rod includes an internal gallery extending between the first and second ends to direct lubricant therebetween. The end of the connecting rod that is aligned with the piston pin bore includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the profiled piston pin. Similarly, the present invention as defined in independent claim 18 is directed toward a piston and connecting rod assembly as described above where the smoothly profiled outer circumference of the pin includes a phosphatized coating and the end of the connecting rod that is aligned with the piston pin bore does not include a phosphatized coating.

Argument

A rejection based on §103 must rest on a factual basis, with the facts being interpreted without a hindsight reconstruction of the invention from the prior art. Thus, in the context of an analysis under § 103, it is not sufficient merely to identify one reference that teaches several of the limitations of a claim and another that teaches several limitations of a claim to support a rejection based on obviousness. This is because obviousness is not established by combining the basic disclosures of the prior art to produce the claimed invention absent a teaching or suggestion that the combination be made. Interconnect Planning Corp. v. Fiel, 774 F.2d 1132, 1143, 227 U.S.P.Q. (BNA) 543, 551 (Fed. Cir. 1985); In Re Corkhill, 771 F.2d 1496, 1501-02, 226

U.S.P.Q. (BNA) 1005, 1009-10 (Fed. Cir. 1985). The relevant analysis invokes a cornerstone principle of patent law:

That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is however, simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. Environmental Designs v. Union Oil Co. of Cal., 713 F.2d 693, 698 (Fed. Cir. 1983) (other citations omitted).

A patentable invention . . . may result even if the inventor has, in effect, merely combined features, old in the art, for their known purpose without producing anything beyond the results inherent in their use. American Hoist & Derek Co. v. Sowa & Sons, Inc., 220 U.S.P.Q. (BNA) 763, 771 (Fed. Cir. 1984) (emphasis in original, other citations omitted).

As the Court of Appeals for the Federal Circuit recently noted, “[w]hen a rejection depends upon a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references.” Ecolchem, Inc. v. Southern Calif. Edison, 56 U.S.P.Q. 2d 1065, 1073 (Fed. Cir. 2000). Specifically, the Examiner must show that a person of ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but some motivation to combine the prior art teachings *in the particular manner claimed*. In re Kotzab, 217 F.3d 1365, 1371 (Fed. Cir. 2000) (emphasis added).

The Examiner has identified the alleged motivation to combine references with the use of bold face type. (See pg. 2 - 4, June 6, 2005 Office Action.) However, the alleged motivation supplied by the Examiner cannot be found in the references and is simply a conclusory interpretation of what the references teach. For example, the Examiner states that there is motivation to combine the Hart et al. and the JP2 ‘821 patents. However, the Examiner has not cited any language from JP2-100821 that would suggest a motivation to combine it with Heart et

al. Rather, the Examiner simply concludes that the problem addressed by JP2-100821 is the same as the problem addressed by Heart et al. (i.e. reducing mass by eliminating a bushing). Yet, JP2-100821 teaches a bushing and multi-part pin, both of which add mass and maintain conventionally known lubrication characteristics. Clearly, Heart et al. teaches away from JP2-10081 by disclosing the use a manganese phosphate coating applied to running surfaces of a steel piston assembly.

There is simply no motivation to combine JP2-100821 with the Hart et al. '457 patent. More specifically, there is no motivation to combine these prior art references in the manner claimed by the present invention. Furthermore, there is no motivation to combine JP2-100821 and Heart et al. '457 with the Fangman '929, DeBiasse '544 and Lindstrom '285 patents. Even assuming that such a motivation existed, a combination of these references would not result in the piston and connecting rod assembly of the type described in independent claims 1, 7, 12 and 18.

It is respectfully submitted that JP2-100821, the Hart et al., Fangman, DeBiasse and Lindstrom patents references skirt around, but do not suggest the claimed invention *as a whole*. See Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1383 (Fed. Cir. 1986). Further, it is respectfully submitted that one must pick and choose elements from the structurally dissimilar devices disclosed in JP2-100821, the Hart et al., Fangman, DeBiasse, and Lindstrom patents and combine these elements by restructuring them, using hindsight and the applicants' own disclosure, to conclude that the claimed invention is obvious. Applicants respectfully submit that this would be improper in view of the disclosures of the prior art.

There is a fundamental axiom in patent law that if a reference must be reconstructed or rearranged to change its operation to meet the applicants' claim, that modification of the

reference is inappropriate and cannot stand. JP2-100821 discloses *a multi-part pin* for assembling a piston and connecting rod and also employs *a bushing* to facilitate contact between the connecting rod and a contoured pin. On the other hand, the Hart et al. '457 patent *teaches away from using a bushing* and discloses using a manganese phosphate coating having a thickness of between 8 and 15 μm in lieu thereof in connection with a unitary wrist pin. This is entirely contrary to the use of a multi-part wrist pin and bushing taught by JP2-100821. Accordingly, the teachings of JP2-100821 and the Hart et al. patent are diametrically opposed and would have to be reconstructed or rearranged to change their operations if they were to be combined.

Furthermore, the Hart et al. '457 patent expressly claims the coating thickness between 8 and 15 microns. Thus, the Examiner's assertion that Hart does not argue the importance of the coating thickness is simply incorrect. Hart et al. claimed this feature, thus, by definition it is important to the invention. Moreover, the applicants contend that the coating thickness disclosed by the Hart et al. '457 patent is excessive and therefore does not have the same properties as a coating thickness between less than 8 and 2 microns. Uehara et al. '518 provides support for Applicants' position that different coating thicknesses provide different properties. See Uehara et al. '518, Column 2, Lines 57-63.

However, unlike the field of braking systems to which Uehara et al. is directed, the tolerances between the components that comprise the small end pivot point (i.e. the small end pin bore, piston pin and piston pin bore) are critical for maintaining acceptable engine life. Specifically, the situation of adjusting the thickness range relative to the size of the piston-engine as suggested by the Examiner is not practical due to the importance of tolerances at this pivot point. To do so would reduce the reliability of this pivot point and the engine as a whole. Thus,

given the disproportionate hardness between the coating and the metals along the pivot point, a thickness coating along this interface of 8 to 15 microns will wear and exceed these tolerances, resulting in vibration, engine noise and premature wear, which reduces the life of the engine.

Furthermore, the mass of the components along the pivot point must be reduced to account for a thickness coating between 8 and 15 microns. Thinner components along this pivot point are not as robust as those having more mass. Thus, a thickness coating between 8 and 15 microns, given the increased tolerances and reduced mass, acts to reduce reliability at this pivot point as well as the entire engine as a whole. On the other hand, independent claims 1 and 7 teach a manganese phosphate coating between two and less than eight microns. In contrast to the teachings of Hart et al., when a manganese phosphate coating thickness between two and less than eight microns begins to wear, the tolerance increase between the engine components does not result in significant vibration, engine noise or premature wear and thus, does not affect the life of the engine.

Additionally, neither the Hart et al. '475 nor JP2-100821 patents teach or suggest the use of a *smoothly profiled piston pin* that is substantially circular in cross-section with a larger diameter at its distal ends than at its center portion and that *tapers gradually from the distal ends to the center portion* as required in each of independent claims 1, 7, 12, and 18. Likewise, the Hart et al. '475 patent and JP2-100821 do not teach or suggest this structure in combination with a connecting rod having an internal gallery as required by independent claims 12 and 18.

On the other hand, the Lindstrom '285 patent teaches the use of a wrist pin having an annular groove and an internal, axial passage. This bears no relation to the combination of a smoothly profiled piston pin and a bushingless connecting rod including a phosphatized coating for use within an internal combustion engine as required by independent claims 1 and 12. The

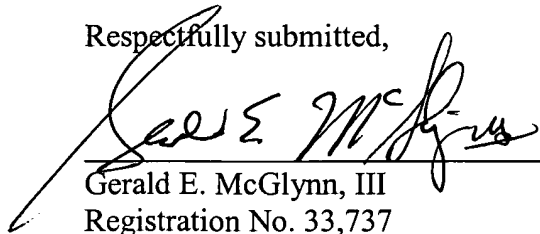
DeBiasse '544, Fangman '929, Kagohara et al. '918 and Uechara et al. '518 patents do not make up for the deficiencies of the JP2-100821, Hart et al. '457 and Lindstrom '285 patents nor do they suggest the subject invention. Thus, applicants respectfully submit that the disclosures of each of these references would have to be improperly modified to meet the limitations of independent claims 1, 7, 12 and 18.

Claims 2 – 6, 8 – 11, 13 – 17, 19 and 20 are all ultimately dependent upon independent claims 1, 7, 12 and 18, respectively, and add further perfecting limitations. However, even if they did, they could only be applied through hindsight after restructuring the disclosure of the prior art in view of applicants' invention. A combination of the prior art in this way to derive applicants' invention would, in and of itself, be an invention.

Conclusion

Thus, the response set forth herein above is submitted to more clearly distinguish the invention claimed over the prior art. Applicants respectfully maintain that the claims clearly distinguish over the prior art and are therefore allowable. Accordingly, applicants respectfully solicit the allowance of claims 1 - 20 pending in this case.

Respectfully submitted,



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